

SANTIAGO

AS A

YELLOW FEVER CENTER

A PAPER PREPARED BY

MAJOR L. C. CARR, SURGEON, U. S. V.

CHIEF SURGEON, DEPARTMENT OF EASTERN CUBA.

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SANTIAGO

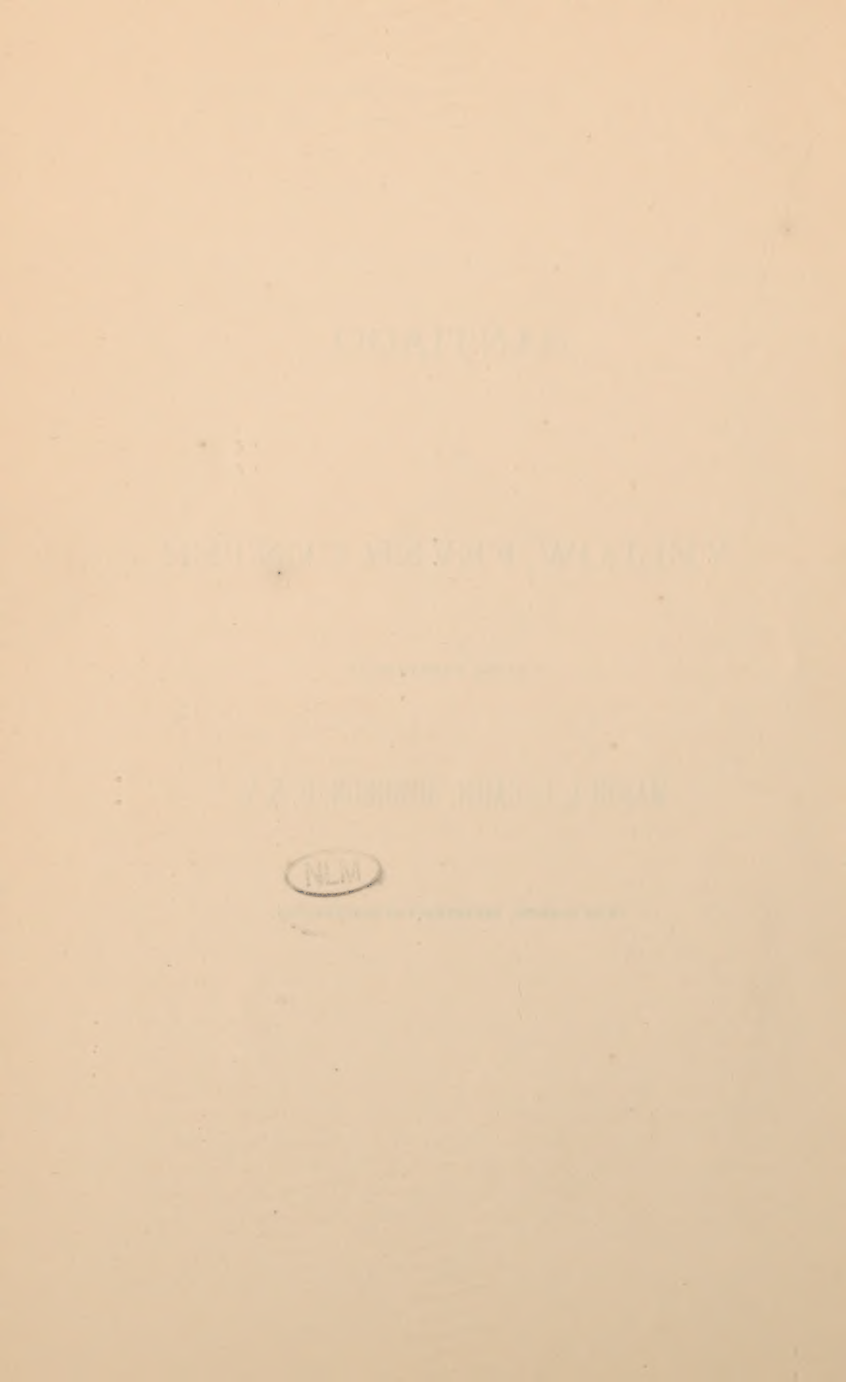
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DEPARTMENT OF EASTERN CUBA.

SANTIAGO DE CUBA.
November 15, 1900.

TO GEO. M. STERNBERG.
Surgeon General, U. S. A.,
WASHINGTON, D. C.

SIR:

I have the the honor to submit the following paper:

SANTIAGO AS A YELLOW FEVER CENTER.

In 1898 I frequently heard the statement made, that for many years Santiago de Cuba and Santos Brazil had been in a class of their own, universally accepted without question as the two filthiest and most unhealthy cities on the globe.

The death rate here given for Santiago, is made from records for the years 1888—1897, both inclusive; they were compiled by Dr. M. J. Rosenau, Marine Hospital Service. who says in submitting his report:

"Santiago de Cuba. May 8, 1899.

Sir:—

I have the honor to transmit herewith, mortuary statistics for the city of Santiago de Cuba during the past ten years. These interesting figures were kindly collected for us by Sr. Eduardo Yero, the Alcalde's clerk, after much searching through musty records. The figures were taken from official reports."

* * * *

It is fair to presume that these records are faulty, and that the number of deaths given is less than those that occurred. The population of Santiago during these years can be only approximately determined, after exhausting all sources of information. I have taken 45,000 as a standard. upon which the following calculations are based:—

YEAR.	SMALL POX.	TUBERCULOSIS.	YELLOW FEVER.	PERNICIOUS FEVER.	FEVERS OTHER THAN YELLOW AND PERNICIOUS.	OTHER DISEASES.	TOTAL.	DEATH RATE PER THOUSAND.
1888	4	139	151	109	83	701	1187	26.37
1889	7	139	131	92	86	702	1157	25.71
1890	2	124	51	58	44	730	1009	22.42
1891	1	169	119	58	149	878	1374	30.53
1892	0	126	6	96	54	817	1099	24.42
1893	0	136	4	57	79	911	1187	26.37
1894	0	132	55	53	68	723	1031	22.91
1895	0	221	631	201	306	1451	2810	62.44
1896	859	316	363	177	457	1840	4012	89.15
1897	4	410	325	239	428	3091	4497	99.93

During this period it will be noted that Tuberculosis and Yellow Fever caused about one-fifth of the total deaths, also that the death rate for 1895, '96 and '97 is abnormally high, even for a filthy tropical city; this rate reached an alarming heighth in 1898. The statistics for 1898, '99 and 1900 are fairly accurate; yet there can be no question but that there were many more cases of yellow fever in Santiago during 1898 than were officially reported, and also, that during July, August and September of that year the population was well over 45,000 but the confusion owing to the campaign is responsible for lack of data.

YEAR.	SMALL POX.	TUBERCULOSIS.	YELLOW FEVER.	PERNICIOUS FEVER.	FEVERS OTHER THAN YELLOW AND PERNICIOUS.	OTHER DISEASES.	DIAGNOSIS UNKOWN	TOTAL.	DEATH RATE PER THOUSAND.
1898	1	415	20	428	581	3393	1179	6017	133.71
1899	4	173	53	136	163	811	43	1383	30.73

Tuberculosis attracts but little attention here. The same remark applies to yellow fever, so far as natives are concerned, and yet the native suffers from the former, while free from the latter: their calenturas are accepted as a necessary evil, and judging from my experience here during a period of twenty-eight months, eighty per cent if not more of the population are subject to recurrent attacks.

In the tables will be noted deaths under the heading "diagnosis unknown": this is a relic of past carelessness, which will not be permitted in the future.

With all of her drawbacks, the Santiago of to-day is very far removed from the Santiago of 1898; her principal trouble at the present time is malaria, which prevails in all of its forms, but it is not so serious as formerly, nor is the pernicious form found so frequently. With the exception of eleven cases of Diphtheria, from which disease we are now free there have been no contagious or infectious diseases this year.

Incomplete as the records are, they show yearly visitations of yellow fever; these records can be traced to the year 1840. It is within reason to say that yellow fever has existed here continuously for over 100 years; many of these annual visitations were epidemics and were very severe, but the data obtainable are too unreliable to quote.

The fever has frequently visited El Cristo, ten miles, and San Luis, twenty-six miles north, also Palma Soriano forty-two miles north-west: all of these points are about 650 feet above the sea level. On the east, Guantanamo has had many visits: the city is fourteen miles from its harbor, Caminera: little hamlets within a radius of fifteen miles of Santiago have also reported frequent visitations. Santiago, never having been free from the disease, was always considered the source of infection. The results this year establish the justness of the claim, for while no such precautions were taken at other places as were taken here, there was no yellow fever within one hundred and fifty miles of Santiago.

The Provinces of Santiago and Puerto Principe comprise nearly one-half the extent of the Island, and the following harbors, large and small, are on their sea-coasts:—Nuevitas, Puerto Padre, Banes, Gibara, Mayari, Sagua de Tanamo, Baracoa, Guantanamo, Santiago, Manzanillo, Santa Cruz and Jucaro. These harbors are visited by vessels of all sizes from every part of the world.

During the year of 1900, the following has been the report from Nuevitas in the Province of Puerto Principe:

Three cases of yellow fever occuring as follows:

The first, a Spaniard, on April 14, 1900; the second on April 27; this case I saw on May 6, and did not agree with the diagnosis; it was the case of a discharged soldier who had been on a prolonged spree; my diagnosis was acute alcoholism, with malarial complications and a prognosis of a fatal termination; after results did not bear out a diagnosis of yellow fever. A sporadic case at that season of the year was out of the question; it was the time for an epidemic; the season of the year, climatic conditions and materials were there—non-immunes from La Gloria, discharged soldiers and newly arrived Spaniards to the number of ninety—and no other case was reported until June 21, fifty-five days later; this latter case was also a Spaniard, and a study of the temperature, pulse and symptoms which had been received by telegraph and from which a chart had been made, made a diagnosis in this case by no means certain. Cuban physicians, as a rule, are not accustomed to meeting cases of drunken and worthless fair-skinned foreigners who may be taken sick from the effects of alcohol, climate and neglect; such cases have been frequent since American occupation, (and noticeably, drunkenness is not a failing of the Cuban race). Given such a case as above stated, you have a congested face, violent frontal headache, congested eyes, jaundice, epigastric tenderness, vomiting and nearly always albumen, all of which are pronounced symptoms of yellow fever; add to this malarial complications, and a diagnosis of yellow fever is easily made.

HOLGUIN. The town is situated about thirty miles from the coast; yellow fever had not visited there for several years; on May 17, 1900, a case was reported, an American six months on the Island, the last two months of this period spent in Holguin, from which place he had not been absent during that time. He reported to the post surgeon sick, was admitted, and six days after admission a diagnosis of yellow fever was made. Symptoms, temperature and pulse rate, three observations daily were asked for by wire; from these telegrams a chart was made; a study of that chart and the fact that in the face of exposure from this patient and the place of his supposed infection no other case occurred in Holguin, rendered the diagnosis in this case extremely doubtful.

On October 13th a Spanish passenger from Havana took sick on the Steamer "Julio" three days out from Havana; he was left at Gibara, the diagnosis was yellow fever; all precautions were taken against its spread. The case resulted fatally; of this case I have received no data; there were no other cases.

In all, four cases have been reported as occurring in these two provinces, three in Puerto Principe province and one in Santiago province, one was not yellow fever, and in the three other cases there was sufficient reason for doubt.

I give in *extenso*, tables for 1898—'99 and for 1900 to October 31.

MORTUARY STATISTICS—SANTIAGO DE CUBA.

(Based on a population of 45,000).

Year 1898.	Small pox	Tuberculosis.	Yellow fever.	Pernicious fever.	Fevers other than yellow and pernicious.	Other diseases.	Diagnosis unknown.	Total.
January.	0	69	4	76	45	315	7	516
February.	0	38	0	50	35	275	1	399
March.	0	50	1	22	15	283	3	374
April.	0	31	0	23	13	193	2	262
May.	0	28	5	17	15	188	1	254
June.	0	38	2	22	12	174	5	253
July.	0	25	0	26	11	271	98	431
August.	0	33	8	86	239	772	414	1552
September	0	21	0	11	35	277	519	863
October.	1	31	0	24	46	296	118	516
November.	0	29	0	21	68	178	5	301
December.	0	22	0	50	47	171	6	296
Total.	1	415	20	428	581	3393	1179	6017

Annual death rate 133.71.

MORTUARY STATISTICS—SANTIAGO DE CUBA.
(Based on a population of 45,000).

Year 1899.	Leprosy.	Small pox.	Tuberculosis.	Yellow fever.	Pernicious fever.	Fevers other than yellow and pernicious.	Other diseases.	Diagnosis unknown.	Total.
Jan.	0	0	23	0	29	45	117	1	215
Feb.	0	0	10	0	21	19	92	5	147
March.	0	0	17	0	16	18	74	3	128
April.	0	0	16	0	6	7	89	4	122
May.	0	0	18	0	5	9	63	6	101
June.	0	0	13	14	9	7	73	5	121
July.	0	0	14	27	12	7	51	5	116
August.	0	0	17	6	9	8	54	2	96
Sep.	3	0	9	3	4	12	41	3	78
Oct.	0	0	10	1	8	6	46	3	74
Nov.	0	0	14	0	4	13	54	4	89
Dec.	1	0	12	2	13	12	54	2	96
Total.	4	0	173	53	135	163	811	43	1383

Annual death rate 30.73.

Mortuary Statistics—Santiago de Cuba.

(Based on a population of 45,000).

YEAR 1900.	LEPROSY	SMALL POX.	TUBERCULOSIS.	YELLOW FEVER.	PERNICIOUS FEVER	FEVERS OTHER THAN YELLOW AND PERNICIOUS.	OTHER DISEASES.	DIAGNOSIS UNKNOWN	TOTAL.
Jan.	0	0	11	0	16	9	83	1	120
Feb.	0	0	16	0	12	1	70	2	101
Mar.	0	0	14	0	10	5	72	3	104
Apr.	0	0	14	0	7	8	68	3	100
May.	0	0	14	0	15	7	80	1	117
June.	0	0	16	0	17	9	49	4	95
Total.	0	0	85	0	77	39	422	14	637

Annual death rate for the six months 28.30

Year 1900	Tuberculosis.	Enteric fever.	Malarial fever.	Whooping cough.	Diphtheria.	Tetanus, Infant.	Meningitis, Infant.	Intestinal diseases.	Heart diseases.	Pneumonia.	Bronchitis.	Nephritis.	Other causes.	Total.
July.	13	1	13	3	0	3	2	10	5	3	0	2	15	70
Aug.	14	2	16	1	0	4	1	5	4	7	0	4	13	71
Sept.	10	1	7	0	0	1	1	4	9	8	4	4	24	73
Total.	37	4	36	4	0	8	4	19	18	18	4	10	52	214

Annual death rate for the above three months 19.00

CAUSES OF DEATHS FOR THE MONTH OF OCTOBER, 1900.

(Estimated population 45,000. Rate mortality 14.93).

Alcoholism.	Appendicitis.	Bronchitis.	Diphtheria.	Cancer	Enteritis.	Enteritis, chronic.	Fever, enteric.	Fever pernicious malaria	Fever, remittent.	Fever, puerperal.	Grippe.	Heart, valvular disease of.	Hemorrhage, cerebral.	Meningitis.	Nephritis, chronic.	Nephritis, parenchymatous.	Noma.	Old age.	Pneumonia.	Spinal sclerosis.	Syphilis, congenital.	Tetanus, infantile.	Tuberculosis, pulmonary.	Tuberculosis, intestinal.	Premature birth.	Total.
1	1	2	1	1	2	1	2	7	1	1	1	3	1	1	1	1	1	1	6	1	1	[illegible]	13	2	1	56

Death rate for the ten months ending October 31, 1900, 24.18

BIRTHS FOR OCTOBER 1900.

Male.		Female.		Total.		Aggregate.
White	Colored.	White.	Colored.	Male.	Female.	
11	22	13	13	33	26	59

This is the first month in which the above statistics have been kept.

For 1900 the Vital Statistics are given in more complete form, showing the changes that American methods have made in the manner of their keeping; all of these changes are new innovations, and much time and labor has been given to introduce them and accustom physicians and officials to their use.

The following tables are self explanatory, and the consideration of the generally accepted theory, that heat and moisture under certain conditions have a definite influence on the propagation of yellow fever, gives to these tables a peculiar interest.

In accordance with that theory, other things being equal, the season of the year 1900 was far more favorable for a yellow fever epidemic than the season of 1899.

For ten days preceding June 15, 1900, (date of outbreak in 1899) the temperature was higher with slightly less moisture than for the same period in 1899, and for the ten days following June 15, the temperature was higher, and there was a greater rainfall in 1900 than in 1899.

From the 11th to the 20th of June, 1900, both dates inclusive, the maximum was but once below 90°, and the minimum ranged from 75° to 77°, dropping to 74° but once in that period, June 18th.

The height of the epidemic in 1899 was in July. During July of 1900, the maximum temperature was 1.1° higher and the minimum .3° lower than in July 1899. The precipitation was .03° higher in 1899 than in 1900.

Date.	MAY, 1899. Temperature. Max	Min	Rainfall.	Yellow fever. Cases.	Deaths.
1	84	66	.26		
2	85	70	.0		
3	85	71	.22		
4	86	70	.06		
5	85	70	.18		
6	85	70	.57		
7	85	70	.02		
8	86	71	Tr.		
9	88	70	.0		
10	90	72	.0		
11	90	72	.0		
12	87	70	.0		
13	88	72	.0		
14	89	71	.25		
15	87	72	.30		
16	86	71	Tr.		
17	88	71	.0		
18	89	72	.01		
19	87	70	.58		
20	87	69	.0		
21	88	71	.0		
22	90	71	.0		
23	89	72	.0		
24	90	73	.0		
25	94	72	.0		
26	91	74	.0		
27	94	72	.04		
28	89	71	1.27		
29	87	72	.15		
30	89	72	.01		
31	85	73	Tr.		

Date.	MAY, 1900. Temperature. Max	Min	Rainfall.	Yellow fever. Cases.	Deaths.
1	87	70	.0		
2	85	75	2.31		
3	87	78	.0		
4	86	77	.0		
5	89	72	0		
6	90	74	Tr.		
7	90	73	.03		
8	90	73	.02		
9	89	74	.01		
10	90	72	.0		
11	84	74	.01		
12	80	72	.20		
13	86	73	Tr.		
14	88	73	.01		
15	87	73	.80		
16	84	76	.49		
17	84	75	.28		
18	84	76	.03		
19	86	75	.17		
20	89	74	.0		
21	89	74	.0		
22	89	75	.0		
23	89	73	.01		
24	90	73	.0		
25	91	73	0		
26	91	74	.0		
27	92	74	.0		
28	91	75	0		
29	94	74	.49		
30	90	74	.23		
31	80	72	.14		

JUNE, 1899.

Date.	Temperature. Max	Temperature. Min	Rainfall.	Yellow fever. Cases.	Yellow fever. Deaths.
1	86	72	.0	0	0
2	88	72	.0	0	0
3	88	72	.0	0	0
4	87	70	.04	0	0
5	88	71	Tr.	0	0
6	87	70	.86	0	0
7	87	73	.35	0	0
8	88	73	01	0	0
9	87	72	.02	0	0
10	87	72	.0	0	0
11	91	72	.03	0	0
12	90	75	.12	0	0
13	88	74	.49	0	0
14	89	71	Tr.	0	0
15	88	72	Tr.	1	0
16	88	72	.0	5	1
17	89	73	.0	2	0
18	90	73	.0	2	1
19	89	75	.0	0	2
20	90	74	.0	5	0
21	91	75	Tr.	3	1
22	93	75	.11	6	1
23	89	74	.01	5	1
24	90	74	.0	3	0
25	91	75	.0	1	1
26	91	75	Tr.	4	1
27	89	74	.16	7	0
28	90	75	.0	7	0
29	91	74	.0	1	2
30	92	75	.0	14	0

JUNE, 1900.

Date.	Temperature. Max	Temperature. Min	Rainfall.	Yellow fever. Cases.	Yellow fever. Deaths.
1	89	67	1.78		
2	88	71	.20		
3	88	73	.19		
4	91	71	.09		
5	91	71	0		
6	90	74	.0		
7	87	73	Tr.		
8	88	71	.29		
9	89	72	Tr.		
10	91	73	.0		
11	88	75	.0		
12	90	76	.0		
13	90	76	.0		
14	90	77	.0		
15	93	77	.0		
16	93	75	.0		
17	91	76	.0		
18	91	74	.0		
19	92	76	.0		
20	92	75	26		
21	91	74	.0		
22	90	74	.05		
23	91	73	.0		
24	90	73	.0		
25	92	73	.0		
26	93	74	.0		
27	91	76	.05		
28	91	75	.0		
29	88	75	.10		
30	83	74	14		

JULY, 1899.						JULY, 1900					
Date.	Temperature.		Rainfall.	Yellow fever.		Date.	Temperature.		Rainfall.	Yellow fever.	
	Max	Min		Cases.	Deaths.		Max	Min		Cases.	Deaths.
1	91	74	.0	5	2	1	89	73	Tr.		
2	91	75	.0	20	1	2	92	72	.01		
3	91	75	.0	13	0	3	90	72	.19		
4	94	75	.0	8	4	4	91	74	.0		
5	91	74	.03	6	2	5	92	74	.0		
6	89	73	.03	9	4	6	92	73	.02		
7	89	75	.0	9	2	7	89	73	.01		
8	90	76	Tr.	2	1	8	92	74	.08		
9	90	72	.0	3	0	9	91	74	.0		
10	92	74	.03	6	1	10	92	75	.0		
11	90	73	.03	5	1	11	92	76	.0		
12	91	74	.0	6	1	12	92	74	.0		
13	91	74	.02	8	1	13	91	77	.0		
14	92	73	.0	3	3	14	93	77	.0		
15	91	74	.07	5	0	15	92	76	.0		
16	89	73	.21	2	0	16	92	75	.0		
17	90	74	.0	3	1	17	91	74	.0		
18	89	75	.0	1	0	18	93	73	.0		
19	91	75	.0	0	3	19	92	75	.14		
20	91	71	.12	3	0	20	92	73	.37		
21	89	72	Tr.	1	0	21	91	73	Tr.		
22	89	72	.0	1	0	22	92	73	.02		
23	93	75	.0	1	1	23	94	73	Tr.		
24	91	77	.0	2	0	24	91	73	.28		
25	90	76	.0	2	0	25	89	72	.04		
26	90	75	.0	0	0	26	92	70	.09		
27	91	75	.05	1	0	27	94	73	.01		
28	91	75	.52	1	1	28	94	75	.04		
29	87	74	.23	2	1	29	90	74	.0		
30	91	74	.0	2	0	30	91	74	Tr		
31	92	73	.0	0	0	31	92	73	.01		

AUGUST, 1899.					
Date.	Temperature.		Rainfall.	Yellow fever.	
	Max	Min		Cases.	Deaths.
1	90	74	.0	2	0
2	92	74	.0	1	1
3	91	73	.01	1	0
4	90	74	.11	0	0
5	90	73	.0	1	1
6	90	71	.0	0	1
7	92	74	.0	2	1
8	96	74	.0	0	1
9	94	75	.0	0	0
10	88	75	.57	1	0
11	84	68	4.38	0	0
12	86	76	.03	1	0
13	89	76	.0	0	1
14	90	74	.0	0	0
15	92	73	.0	0	0
16	90	75	.0	0	0
17	91	74	.0	2	0
18	90	74	.0	1	0
19	90	75	.0	0	0
20	92	74	.0	1	0
21	91	74	.0	0	0
22	90	73	.0	0	0
23	92	73	.0	0	0
24	92	76	.0	1	0
25	91	75	.0	0	0
26	91	74	.06	0	0
27	92	73	.0	0	0
28	91	74	.0	2	0
29	92	74	.0	1	0
30	93	75	.0	0	0
31	96	76	.0	2	0

AUGUST, 1900.					
Date.	Temperature.		Rainfall.	Yellow fever.	
	Max	Min		Cases.	Deaths.
1	92	73	.0		
2	91	76	.0		
3	94	74	Tr		
4	94	74	.0		
5	94	75	Tr.		
6	92	74	.36		
7	90	74	.10		
8	91	74	Tr		
9	91	72	Tr.		
10	92	74	.0		
11	93	74	.40		
12	92	74	.0		
13	95	74	.01		
14	92	74	.20		
15	91	73	Tr.		
16	94	75	.0		
17	93	76	.0		
18	92	75	Tr.		
19	93	73	2.11		
20	90	75	.12		
21	90	75	.0		
22	92	72	.06		
23	93	73	.0		
24	91	75	.31		
25	95	76	.0		
26	92	75	Tr.		
27	91	75	.17		
28	92	74	.75		
29	88	73	Tr.		
30	87	74	.64		
31	89	75	.66		

SEPTEMBER, 1899.						SEPTEMBER, 1900.					
Date.	Temperature.		Rainfall.	Yellow fever.		Date.	Temperature.		Rainfall.	Yellow fever.	
	Max	Min		Cases.	Deaths.		Max	Min		Cases.	Deaths.
1	92	77	.03	1	0	1	91	74	.68		
2	94	75	.0	0	0	2	89	73	.54		
3	90	74	.03	1	0	3	80	72	10.89		
4	92	76	.26	1	0	4	76	69	7.22		
5	91	75	.0	1	0	5	86	72	1.78		
6	91	74	.15	0	0	6	86	72	2.29		
7	91	75	.30	1	0	7	77	71	3.25		
8	89	74	.11	0	0	8	82	74	.29		
9	91	75	.06	2	0	9	86	71	1.24		
10	92	75	.12	2	0	10	89	73	.14		
11	90	73	.28	0	0	11	89	73	.0		
12	88	74	1.58	0	1	12	90	75	.0		
13	86	70	1.15	0	0	13	91	73	.0		
14	89	72	.0	2	1	14	91	72	.63		
15	90	74	.0	0	0	15	89	73	.02		
16	91	75	.02	0	0	16	89	72	.0		
17	90	74	.0	0	0	17	90	73	.0		
18	90	74	.0	0	0	18	92	70	.0		
19	91	75	.0	1	0	19	92	74	.0		
20	91	75	.0	1	0	20	92	73	.0		
21	91	75	.0	0	0	21	91	73	.0		
22	87	73	.05	0	0	22	90	73	.19		
23	91	73	.0	0	0	23	91	73	.0		
24	91	73	.01	1	1	24	92	73	.0		
25	92	75	.0	0	0	25	94	75	.33		
26	90	76	.0	0	0	26	91	74	.0		
27	90	75	.52	0	0	27	90	73	.0		
28	92	73	.63	0	0	28	92	73	.0		
29	90	74	.01	0	0	29	93	74	.0		
30	90	74	.04	0	0	30	90	71	.0		

OCTOBER, 1899.

Date.	Temperature. Max	Temperature. Min	Rainfall.	Yellow fever. Cases.	Yellow fever. Deaths
1	90	74	.14	2	0
2	90	74	.03	0	0
3	86	73	.16	0	0
4	85	74	.69	0	0
5	85	73	.01	0	0
6	89	73	.0	0	0
7	90	75	Tr.	0	0
8	91	74	Tr.	1	0
9	89	72	Tr.	0	0
10	91	72	Tr.	1	0
11	88	74	.15	0	0
12	90	74	.03	0	0
13	87	69	.50	0	0
14	84	70	.06	0	0
15	83	71	.41	0	0
16	84	73	.23	0	0
17	88	69	.0	0	0
18	90	74	.26	0	0
19	90	74	.36	1	0
20	88	74	.25	0	0
21	88	72	Tr.	0	0
22	88	72	.25	0	0
23	85	72	.12	0	0
24	87	72	1.25	1	0
25	81	73	.09	0	0
26	84	71	.38	1	0
27	74	71	6.09	0	0
28	78	71	2.73	0	0
29	82	72	2.58	0	0
30	85	74	2.29	0	0
31	85	70	.0	1	0

OCTOBER, 1900.

Date.	Temperature. Max	Temperature. Min	Rainfall.	Yellow fever. Cases.	Yellow fever. Deaths
1	86	73	.0		
2	84	71	.82		
3	88	71	Tr.		
4	89	73	.29		
5	88	72	.0		
6	89	72	.0		
7	91	72	.0		
8	90	73	.0		
9	90	73	.0		
10	92	74	.06		
11	89	75	.0		
12	90	72	.0		
13	90	72	.03		
14	90	71	.0		
15	88	70	.95		
16	89	72	.0		
17	90	71	.0		
18	90	72	.0		
19	90	73	.0		
20	89	75	0		
21	92	72	1.17		
22	89	73	.14		
23	89	74	Tr.		
24	89	72	.0		
25	87	71	Tr.		
26	84	69	.14		
27	84	72	.62		
28	86	71	.0		
29	86	71	.03		
30	81	74	.07		
31	89	74	.02		

A COMPARATIVE STUDY OF THE CONDITIONS EXISTING DURING THE YELLOW FEVER SEASONS IN HAVANA AND SANTIAGO GIVES THE FOLLOWING TABLES:—

1899	Temperature.				Rainfall.		Yellow Fever.			
	Max.		Min.				Cases.		Deaths.	
	Hav.	Stgo.	Hav.	Stgo.	Hav.	Stgo.	Hav.	Stgo.	Hav.	Stgo.
May.	89.0	87.6	66.0	71.1	1.64	3.92	2	0	0	0
June.	90.0	89.1	68.0	73.1	2.79	2.20	4	66	1	14
July.	91.0	90.5	69.0	74.1	3.87	1.34	6	131	2	30
Aug.	92.0	90.9	73.0	74.0	.14	5.16	34	19	13	6
Sept.	90.0	90.4	73.0	74.2	2.97	5.35	54	14	18	3
Oct.	89.0	86.3	68.0	72.5	5.82	19.06	63	5	25	0

1900.	Temperature.				Rainfall.		Yellow Fever			
	Max.		Min.				Cases.		Deaths.	
	Hav.	Stgo.	Hav.	Stgo.	Hav.	Stgo.	Hav.	Stgo.	Hav.	Stgo.
May.	88.0	81.1	69.0	73.9	9.96	5.23	5	0	2	0
June.	91.0	90.1	68.0	73.9	3.43	3.15	19	0	8	0
July.	90.0	91.6	71.0	73.8	5.40	1.31	96	0	30	0
Aug.	90.0	91.7	72.0	74.2	1.72	5.89	219	0	49	0
Sept.	90.0	88.7	71.0	72.7	4.25	29.49	269	0	52	0
Oct.	90.0	88.3	70.0	72.3	1.95	4.34	308	0	74	0

AVERAGE FOR SIX MONTHS.

	Temperature.				Rainfall		Yellow Fever			
	1899.		1900				Cases.		Deaths	
	Max.	Min.	Max.	Min.	1899	1900	1899.	1900.	1899.	1900
Havana.	90.01	69.50	89.83	70.16	17.23	26.71	163	916	59	215
Santiago.	89.13	73.13	89.90	73.46	37.03	49.41	235	0	53	0

Manson on tropical diseases, voices the accepted view of experts, when he says:

"For its development in epidemic form, yellow fever requires a temperature of over 75° Fahr. It ceases to extend its area when the thermometer sinks below this point, and it stops abruptly as an epidemic when the freezing point is reached: although—as proved by the recurrence of the disease two years in succession in one of the Spanish epidemics, and that without a fresh introduction—the vitality of the germ may not be extinguished and killed outright by frost. Dampness favors yellow fever: it is therefore most prone to occur during the rainy seasons.

Conditions of soil required.—Further, it is not every spot that affords the extra-corporeal conditions demanded by the germ. It would appear that an admixture of animal matter must enter into the composition of the nidus: decomposing vegetable matter does not suffice."

If this means that a case of yellow fever must exist, before these conditions will have any effect in causing an epidemic, I have not been so taught. In a city wherein yellow fever is due to importation, a case must be brought before any meteorological condition can be considered as bearing on its spread. It is also true that these conditions are coexistent with an epidemic of yellow fever.

But how apply such theory here where the disease has been endemic for years and is also presumably indigenous? must importation also be had?

I have until now always believed that such weather was the one thing necessary to cause an outbreak of yellow fever in a city wherein the disease was endemic, if the other requirements were there and the non-immunes were present.

A study of the tables given, and consideration of conditions existing at Havana and Santiago, indicates that the theory is fallable.

Here we have two cities wherein yellow fever has been endemic for many years: Havana in 1899, from May to October, both months inclusive, had a mean temperature of 79.75, percipitation 17.23, cases of yellow fever 163, deaths 59. For the same period in 1900 the mean temperature was 79.49, precipitation 26.71, cases of yellow fever 916, deaths 215.

For the year 1899, the immigration was 16,260, for the ten months ending October 31, 1900, the immigration was 16,859.

For the same six months, Santiago in 1899 had a mean temperature of 81.13, precipitation 37.03, cases of yellow fever 235, deaths 53; and for the same period in 1900 the mean temperature was 81.68, precipitation 49.41, and no yellow fever.

In 1899, Santiago had a non-immune population of from 1,300 to 1,500. In 1900 the non-immune population was over 1,300.

All of the conditions required by the heat and moisture theory were present in both cities. Havana had a higher mean temperature in 1899 and less of a rainfall than she had in 1900; the difference in the epidemic can be seen.

Santiago had a higher mean temperature and a greater rainfall in 1899 than Havana had in either year cited, and in 1900 Santiago's rainfall was much greater and her mean temperature higher than in 1899.

It seems to me that in view of these facts, the theory that heat and moisture play the all important role in the development of yellow fever, must fall, and the admission only granted that these conditions are co-existent with an epidemic of yellow fever.

The deductions made from his observations by Touatre in New Orleans, cannot apply to conditions here in Santiago, for the reason, it is affirmed that when yellow fever appears in New Orleans it is due to importation. Here it is endemic.

It would be egotistical to assert, that our work here was the sole cause for the non-appearance of yellow fever in 1900, especially after the severe epidemic of 1899. Also, to further assert that the sanitary work done in Havana had been a failure would be pessimistic.

I have endeavored to obtain data from Kingston, Jamaica, for comparison with conditions existing here, but it is difficult to obtain official information. On November 11th I had the good fortune to meet Mr. Goldsmith Williams of the Cuba Fruit Company, a gentleman of keen observation who has lived much and travelled extensively in the West Indies; from him I gathered the following facts:

He thinks that until 1897 Kingston was nearly as filthy as Santiago; he described the open sewers in the streets and characterized the odors as unbearable; the older and business portion of the city he said, was built much similar to Santiago; climatic conditions were almost identical; they

do not fear yellow fever, and until 1897 they took no precautions other than quarantine against infected ports. The disease has never been considered endemic there. The inhabitants attribute their safety to the trade winds which blow steadily over the city for from ten to fourteen hours daily; so much are they impressed with the truth of this that the trade winds are called their doctor.

After the epidemic of 1897 the sewer system was completed, and since then Kingston has been in a much better sanitary condition.

Jamaica is eighty miles south of here and Kingston is on its south coast; in all about 140 miles from Santiago, a little west of south. The letter here given contains all the official information I have been able to obtain:—

"British Consulate,
Santiago de Cuba, July, 12, 1900.

Major L. C. Carr,
Chief Surgeon, U. S. V.
Santiago.

Sir: —

I have the honor to inform you that I have just received under date 25th of June, an answer from the Superintending Medical Officer, Jamaica, to my enquiry of April, regarding yellow fever epidemic in Kingston and which is as follows:—

"I have the honor to acknowledge receipt of your letter dated 11th April last, and, in reply, to inform you that the Records at my disposal do not go further back than the year 1879, from that date to the year 1896, with the exception of one or two sporadic cases at long intervals, there was no Yellow Fever in Kingston.

In 1897 we had an epidemic when seventy-two cases were recorded, since then Kingston has been free from yellow fever.

2. I regret that a press of work and other matters have prevented my replying to your letter earlier."

I am, Sir,
Your most obedient servant,
(Signed) Rob. Mason,
Consul.

Mr. Williams further informed me, that in 1897, the authorities claimed to have located the first case of yellow fever. The patient was a man who had left an infected port of Central America a short time before. The authorities agreed that this case was responsible for the epidemic, which they asserted was due to importation. I give this statement without comment.

The question here raised as to the part played by heat and moisture in the development and propagation of yellow fever, is worthy of more study than has been given to it in

the past. It appears to me that too much has been taken for granted.

Consideration of the obstacles that were encountered and the steps taken to overcome them, may enable the reader to arrive at a conclusion as to what fact or factors we owe our escape.

1. Meteorologically, the conditions existing in 1900 were more favorable for an epidemic of yellow fever than the conditions which existed in 1899.

2. Food for the fever.

A careful census made by 1st Lieut. Edward F. Geddings, Assistant Surgeon, U. S. A., and Dr. Richard Wilson, Acting Assistant Surgeon, U. S. A., shows that during the dangerous period from April to October we had a resident and floating population of over 1,300 non-immunes, and the greater majority of these were of that dangerous class migratory loafers. This condition varies very little from that of 1899.

3. Owing to the style of Architecture, the manner of construction and the crowding together of the buildings, disinfection by fumes or vapors, was out of the question.

4. There were forty-one distinct foci of infection in the city and twelve in the outskirts and small towns adjoining; these were known. It was the unknown points that were feared.

5. The residents being immune have no fear of yellow fever, consequently their carelessness and in many instances their resenting of American methods of sanitation, made our work very difficult.

6. The custom of the people, throwing urine and other filth into the streets was an element of grave danger; this practice has not been overcome, nor will it be until a system of sewerage shall have been established.

7. Our limited water supply has made our work very trying; at this writing it is the best we have ever had, five gallons per capita. During the dangerous season it was very much less, and but one-fourth of the city was supplied at one time, the average being eighteen hours of the twenty-four without water.

8. The privy system here is abominable; many of the old vaults had not been cleaned for over fifty years. Their location adjoining kitchens and cisterns rendered them very offensive and extremely dangerous. Butcher shops, baker-

ies and groceries, were invariably found to be in bad condition. In the bakeries, horses were found in stalls adjoining ovens, and seepage of decomposing urine into the work rooms was the rule, some mixing rooms were found covered with living filth; butcher shops and groceries with piles of rotten offal in back rooms and patios; but, nevertheless, this class of people have been found amenable to reason when shown the way.

9. Owing to the fact that we had an inadequate water supply, the newly laid sewers had not been in use and the manholes along their course would fill rapidly and become very offensive and dangerous.

10. I feel constrained to here call attention to the most serious among the obstacles that were encountered:

The evident and expressed wish of the Marine Hospital Officer that we should have yellow fever here.

His printed circular prior to April 1, 1900, which had the full force of an order, driving all of the army ladies out of the country.

His curt refusal to co-operate with the Military and Civil Authorities.

His strenuous endeavor to prevent our having a quarantine against Havana.

His public and written statement that we would have yellow fever here, the only question being in which month it would develop.

His prophecies and public utterances, all of which were a grave reflection upon the service he represented.

Circular Letter No. 3, Headquarters Department of Santiago and Puerto Principe, March 30, 1900, by order of Colonel Whitside, contains this paragraph:—

"All cases of contagious or infectious diseases, or suspected to be such, shall be reported to the President of the Board (Chief Surgeon's Office,) who shall immediately notify at least three members of the Board to examine and decide the nature of each case so reported. The opinion of the examining members shall be expressed in writing over their signatures and handed to the President of the Board.

No case of contagious or infectous disease shall be officially recognized except when reported by the Board of Health."

In direct opposition, he endeavored on April 23rd, to place in our yellow fever hospital, over which hospital he had no control, a case diagnosed by him as yellow fever; this endeavor on his part created great consternation in the city; a committee of four physicians visited the sailor, who was then in the eighth day of his sickness, diagnosed the case as

typhoid fever, sent the patient to the Civil Hospital, and so reported to the Department Commander.

This act resulted in his recall: that it was his first official experience in a position of command, that he had only a superficial knowledge of yellow fever and that he was a youth, may be offered in extenuation.

The Marine Hospital Service knew that Santiago was a station of great importance; also one entailing grave responsibility, and it has too many well equipped officers and gentlemen in its corps to have permitted, even for a day, such conditions to exist after the facts were brought to its knowledge.

Dr. M. J. Rosenau, who preceded the officer referred to, on duty here, was thoroughly equipped, did his work carefully, effectually and without friction, and was always a gentleman.

So with Dr. R. H. von Ezdorf, the present incumbent, who succeeded him; coming, as he did, into an atmosphere of discontent, distrust and general misunderstanding, he cleared it in a remarkably short space of time, and won the confidence and respect of all with whom he came in contact. This report shows what our success has been and much of the credit belongs to Dr. R. H. von Ezdorf, who in addition to his other qualities is an untiring worker.

To a station of such importance the Marine Hospital Service should detail only of its best officers, for competent and gentlemanly medical men will always work in harmony with other authorities when the object is the greatest good for the greatest number.

I have weighed this matter long and carefully before concluding to make these facts public, but the gravity of the situation, the possibility of a similar happening, the powers for good or evil that lie in the hollow of one man's hand when appointed to such a post by the Marine Hospital Service have outweighed all other considerations.

Steps Taken For a Prevention of an Outbreak.

1. Tramps. Recognizing the danger from this element, among whom yellow fever usually makes its first appearance, and fully aware of the utter hopelessness of locating the foci when such people would be attacked, an effort was made to reason with them to protect themselves while protecting the city: work was found on roads, buildings and in

the iron mines, and on May 25th, some sixty-eight of the most dangerous were arrested; forty were Spaniards, three Americans, eight Jamaicans and the rest of various lands.

The Spanish, French and English Consuls, all in thorough accord with this movement, in company with the Chief Surgeon, visited them and matters were fully explained; eleven of them were sent to the hospital and fifty-seven were instructed to call at an office where a clerk was kept on duty all day distributing them to places as seemed suitable; the next day four of the fifty-seven called for work. In June another effort was made; about sixty were arrested and told that there was work for fifty but that it was not compulsory; only five of the number agreed to work. The Department Commander then authorized the Alcalde to have them arrested under the Spanish tramp act, as vagrants. This form of arrest began July 1, 1900, and arrangements were perfected to rid the city of this dangerous element. They caused us more or less trouble during the entire period until October 31st.

2. On March 1, 1900, the general re-disinfection of the foci began with a trained force, under the direct control of an experienced and capable chief. The disinfectant used was corrosive sublimate (strength one-half pound to fifty gallons of water with the addition of one and one-half pounds of salt to a fifty gallon barrel.)

Force pumps were used on walls and ceilings, and floors were scrubbed and drenched; where the force pump could not reach, swabs were used. This disinfection was completed by July 1, 1900. All of these places were re-disinfected; some of the filthy houses, three or four times, and cafes, lodging houses and resorts frequented by non-immunes, every three or four weeks.

3. A careful watch was kept over the town. The indiscriminate throwing of filth into the streets was in a measure prevented, and it was only permitted at a stated hour, while not avoiding, this requirement lessened the danger. It was Hobson's choice.

4. Our limited water supply is a proposition upon which the Engineer Department is still at work.

5. About 500 latrines were found to be in a dangerous condition; the records of the Sanitary Department show that of this number, 350 were cleaned or contract made for their cleaning. On June 22nd, the second inspection began of

places reported dangerous on the first inspection: a list of houses with owners and tenants who had failed to comply with the Sanitary regulations was submitted to the Alcalde with request that these parties be proceeded against at once in accordance with the regulations. The inspection showed that the most dangerous part of the city is the district bounded on the north by the Paseo de Concha, the south by Marino, the east by Gallo and the west by Cristina streets, which is owing to the fact that this section receives all of the ground wash of the entire city and the privy vaults here are constantly filled to overflowing. The regular force of vault cleaners were not enough for the increased work made by these inspections; therefore many of these contracts were sub-let to contractors whose work has proved very satisfactory. In pursuing this work, a remarkable condition has been presented, which it is hoped is only a local and not a general characteristic of the people of Cuba: the poorer and uneducated classes have offered no objections and where poverty did not absolutely prohibit, obeyed the instructions of the inspectors as best they could. *Per contra*, many dangerous places were found belonging to and inhabited by the people of education, refinement and wealth, a number of whom had traveled extensively abroad, representing the different professions and belonging to the best families in the city; several of such have not only positively refused to clean their homes, but have been discourteous and insulting in their refusals.

6. The manholes referred to were pumped out every day and arrangements were made to thoroughly disinfect them after every pumping.

In all of this work, the Department Commander, Colonel Samuel M. Whitside, took an active interest and was in hearty sympathy with all efforts to this end; his suggestions as to ways and means were ready and valuable, and he always accomplished measures recommended by his Chief Surgeon in the shortest possible time and with but little or no friction.

For an Officer so long connected with purely military duties to quickly grasp and thoroughly comprehend the manifold difficulties solely sanitary and altogether civil, was an agreeable surprise to me, and it is beyond question that without his earnest support and advice results here given could not have been obtained.

The Cuban, from a Sanitary standpoint, is of a class with which the American Sanitarian is not familiar. The manners, creeds and customs of his for-bears are to him sacred; any attempt to improve his sanitary condition that conflicts with his inherited beliefs, is regarded as bordering on sacrilege.

Santiago as a home of yellow fever was part of his heritage; that existing conditions affected the future of the people, crippled the commerce of the Island, endangered the lives of others and retarded the growth of his city, did not appeal to him. He was immune and had no fear.

The following from the New York Medical Record, page 20, July 7, 1900, shows this feeling:—

"El Cubano", an Havana newspaper, recently revealed one of the reasons for this opposition. It said, "the Cubans justly and properly object to the expenditure of such a large proportion of the revenues of the Island in measures intended to repress yellow fever, for the only result of such measures is to protect the lives of the Americans, since the Cubans themselves are immune from yellow fever."

Spanish law is admirably fitted to interfere with Sanitary procedure, and its aid was frequently invoked by people of the better class, when they thought that the health regulations being enforced were interfering with their personal comforts or desires.

My observations, covering a period of twenty-eight months, have led me to the conclusion, that for some time to come, the people of this Island will not be prepared or inclined to take hold of sanitary measures, and therefore what ever Cuba's future may be, the United States will be culpably negligent of her own interest, of the interest of her southern states in particular and of the world in general, if she permits health regulations, sanitary measures and quarantine restrictions to pass from her control before she is convinced that these matters are thoroughly understood and will be faithfully and intelligently prosecuted by the people of Cuba.

Wasdin says in his conclusions, "The Journal of the American Medical Association," October 6, 1900:

> "That the bacillus icteroides is very susceptible to the influences injurious to bacterial life, and that its ready control by the processes of disinfection, chemical and mechanical, is assured."

This statement will not be questioned as it is one of the few points in connection with yellow fever that admits of no dispute.

Even in a filthy tropical city, without proper sewerage, without any Sanitary standard whatever, the work of disinfection can be pushed to a successful issue.

This fact is fairly in evidence: the foci of yellow fever are in certain definite places in a city where it is endemic. The habitat can be located and as fast as one appears it should be guarded closely, and with all of its belongings, disinfected thoroughly, and, as an added precaution, redisinfected at intervals during the danger period; these places should be kept under continual surveillance and treatment and no pains or expense should be spared to render the contagion at such points inert.

I am further convinced that our work in Santiago did much to ward off an attack, and yet this question intrudes itself, were there not many foci that escaped us? That there were is undoubtedly true; but we took care of all that were of record and were prepared for any new ones that might appear.

There is still much in connection with meteorological conditions and nature of nidus necessary for the propagation of this scourge that we do not clearly understand.

Nearly all of the best men, men of scientific attainments who have had practical experience in the care of yellow fever, and in the sanitation of cities wherein the fever was epidemic, are now engaged in laboratory work, endeavoring to demonstrate which germ is responsible for this scourge. We all must admit that the object is a most laudable one and our hope is that it will soon be determined beyond all doubt.

But would not the interest of humanity be better conserved if the sanitary measures in the cities wherein yellow fever is endemic, were under the constant watch and control of some such men?

After an epidemic, this important work—looking to a prevention of a recurrence—is often left in the hands of inexperienced and carless persons. Why should not some of these men devote their entire time and attention to preventive measures, giving intelligent supervision to methods that we have, and know to be reliable?

Before closing I wish to call attention to the work of 1st Lieut. Ira A. Shimer, Ass't Surgeon, U. S. A., as Sanitary

Inspector. He enthused the whole force with his energy and personally supervised all details. He satisfied himself by personal inspection that all work outlined was being faithfully performed. During his absence on leave, this work was in charge of Acting Assistant Surgeon Milton Vaughan, U. S. A., who carefully directed its prosecution. 1st Lieut. Edward F. Geddings, Ass't Surgeon, U. S. A., was on duty in connection with contagious diseases, his knowledge of yellow fever and the methods of its handling, made him especially valuable at this time.

I desire to express my thanks to Major Valery Havard, Surgeon, U. S. Army, Chief Surgeon Division of Cuba, Major William C. Gorgas, Surgeon, U.S.A., Chief Sanitary Officer of Havana; Assistant Surgeon, R. H. von Ezdorf, Marine Hospital Service and also Mr. A. V. Randall of the Weather Bureau, for data, from which these tables have been compiled, and further to thank the Officers of the Departmental Staff for their unvarying courtesy and the assistance rendered me whenever it was required.

Nov. 26th, the date of completion of this paper, 11 months have passed, during which Santiago has been free from yellow fever.

Under these conditions the possibility of a case occurring in December is very improbable.

L. C. CARR,
Major and Surgeon, U. S. V.,
Chief Surgeon.